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10/673,388

09/30/2003

Chih-Tsung Shih

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EXAMINER

LAVARIAS, ARNEL C

ART UNIT

PAPER NUMBER

2872

MAIL DATE

DELIVERY MODE

09/18/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/673,388

Applicant(s)

SHIH ET AL.

Examiner

Arnel C. Lavarias

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 10-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 10-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/31/07 has been entered.

### ***Response to Amendment***

2. The amendments to the specification of the disclosure in the submission dated 7/31/07 are acknowledged and accepted.
3. The amendments to Claims 1-6 in the submission dated 7/31/07 are acknowledged and accepted.
4. The addition of Claims 10-12 in the submission dated 7/31/07 is acknowledged and accepted.

### ***Response to Arguments***

5. The Applicants' arguments filed 7/31/07 have been fully considered but they are not persuasive, and are further moot in view of the new ground(s) of rejection.
6. Claims 1-6, 10-12 are now rejected as follows.

***Claim Objections***

7. Claim 4 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In particular, the recited subject matter of Claim 4 (i.e. the alternate layers of GaAs and AlAs) is already present in Claim 2.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 5 recites the limitation that the multi-layered film is formed by alternate layers of TiO<sub>2</sub> and SiO<sub>2</sub>. Claim 5 is directly dependent on Claim 2, which itself already specifies that the multi-layered film is formed by alternate layers of GaAs and AlAs. The specification of the instant application (See for example Page 5, lines 11-14; Page 8, lines 5-9 of the instant application) fails to adequately disclose that such multi-layered film may be fabricated using all of TiO<sub>2</sub>, SiO<sub>2</sub>, GaAs, and AlAs simultaneously.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 3, 11, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fan (U.S. Patent No. 6807342), of record, in view of Tehrani (U.S. Patent No. 5430574), of record.

Fan discloses a tunable filter (See Abstract; Figures 2, 4; col. 2, line 13-col. 3, line 17) with a wide free spectral range, comprising a first optical fiber (See for example 24 in Figure 2, 24' in Figure 4); a second optical fiber (See for example 22 in Figure 2, 22' in Figure 4) with one end opposed to the first optical fiber; and a reflector (See for example 12, 13, 14, 16, 18, spacer between 16 and 13 in Figure 2; 13, 14, 18', spacer and grounded layer in Figure 4; wherein all of these layers have been taken, as a whole, to be a single piece) interposed between the first optical fiber and the second optical fiber, the reflector comprising a curved lens (See 12, 18 in Figure 2; 25 in Figure 6); wherein the curved lens and the second optical fiber define a resonance cavity to determine a resonance frequency (See 18, 19 in Figure 2; 18', 19' in Figure 4; wherein the resonance frequency for a Fabry-Perot resonance cavity is necessarily as disclosed as Equation 1 (See col. 4) in Fan). Fan additionally discloses the multilayered film formed with alternate layers of GaAs and AlAs or alternate layers of TiO<sub>2</sub> and SiO<sub>2</sub> (See col. 2, lines 22-65); the reflector comprising a base (See for example 16 in Figure 2); an aperture (See

central portion of layer 16) defined on the base; and a multi-layered film (See 12, 18 in Figure 2) with high reflection capability formed on the base and extending over the aperture, wherein the multi-layered film extending over the aperture serves as the curved lens (See 12, 18 in Figure 2; 25 in Figure 6) and the curved lens has no contact with the base; and the tunable filter being an electrostatic-actuated type filter (See col. 2, lines 22-65), and the reflector being a micro-electromechanical system-based (MEMS-based) one-piece reflector (See for example 12, 13, 14, 16, 18, spacer between 16 and 13 in Figure 2; 13, 14, 18', spacer and grounded layer in Figure 4; wherein all of these layers have been taken, as a whole, to be a single piece) comprising a dielectric layer and an electrode layer sequentially formed on a base with an aperture, both the dielectric layer and the electrode layer have an opening corresponding to the aperture (See for example 13, 14 in Figure 2). Fan lacks the first and second optical fibers including collimators. However, Tehrani teaches a tunable filter with a wide free spectral range (See for example Figures 3-7 of Tehrani), comprising a first collimator on a first optical fiber (See 14 in Figure 3 of Tehrani); a second collimator on a second optical fiber and opposed to the first collimator (See 15 in Figure 3 of Tehrani); and a mirror (See 21 in Figure 3 of Tehrani) interposed between the first and second collimators, with an appropriate tilt angle (It is noted that the surface of the mirror at the point of light incidence is tilted orthogonally to the propagation axis of the incident light) and a high reflectivity lens, such as a concave lens (It is noted that the mirror 21 provides a surface with a concave curvature which will also inherently provide a lensing/focusing function to the incident light reflected back from element 21 in Figure 3 of Tehrani), whereby a resonance cavity is defined in a space

between the mirror and the second collimator (See space between 21 and 22 in Figure 3 of Tehrani). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first and second optical fibers of the tunable filter of Fan include collimators, as taught by Tehrani, for the purpose of mode matching and focusing the incident light to reduce optical losses.

12. Claims 2, 4-5, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fan in view of Tehrani as applied to Claim 1 above, and further in view of Domash (U.S. Patent Application Publication US 2003/0072009 A1), of record.

Fan in view of Tehrani discloses the invention as set forth above in Claim 1, except for the tunable filter being a heat actuated type filter. However, the use of heat-, piezoelectric-, and electrostatic-based actuators to adjust the Fabry-Perot reflector spacing to provide center wavelength tunability is well known and conventional in the art. For example, Domash et al. teaches a tunable thin film Fabry-Perot filter (See for example 101 in Figure 1), wherein central wavelength tunability is provided for by the use of a heat conducting film resistor deposited onto the Fabry-Perot filter, the film resistor being connected to a temperature controller (See 102 in Figure 1; Figures 3-9; Paragraphs 0059-0068). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the tunable filter of Fan in view of Tehrani, be a heat actuated type filter, as taught by Domash et al., for the purpose of providing rapid, repeatable, and wide shifts in the transmission wavelengths of the filter without use of moving parts.

13. Claim 6, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Fan in view of Tehrani as applied to Claim 1 above, and further in view of Huang (U.S. Patent No. 6263128), of record.

Fan in view of Tehrani discloses the invention as set forth above in Claim 1, except for an antireflection layer coated on the end of the first collimator. However, the use of antireflective coatings on surfaces of optical elements, such as collimators and lenses, are well known and standard practice in the art. For example, Huang teaches a particular embodiment of a Fabry-Perot etalon filter (see for example Figures 6-7), wherein the surfaces of one or both of the collimators (See 71, 72 in Figure 7) may be coated with an antireflective film (See 77 in Figure 7). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have an antireflection layer be coated on the end of the first collimator, as taught by Huang, in the tunable filter of Fan in view of Tehrani, for the purposes of reducing optical noise due to unwanted back reflections in the incident signal.

14. Claim 10, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Fan in view of Tehrani as applied to Claim 1 above, and further in view of Pan (U.S. Patent No. 5359683), of record.

Fan in view of Tehrani discloses the invention as set forth above in Claim 1, except for each of the first and the second collimators having an inclined plane. However, Pan teaches conventional fiber optic based collimators (See in particular Figures 3-5 of Pan), wherein such conventional fiber optic collimators include a cylindrical glass ferrule (See 24 in Figures 3-4 of Pan), a graded index lens (GRIN lens) (See 21 in Figures 3-4 of



Pan), and a hollow cylindrical holder (See 30 in Figures 3-4 of Pan). In addition, Pan teaches that the fiber optic collimators include a slanted surface (See 24A in Figure 4 of Pan) with an anti-reflection (AR) coating (See 24A, 29 in Figure 4; col. 3, lines 47-59 of Pan). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have each of the first and the second collimators of Fan in view of Tehrani, have an inclined plane, as taught by Pan, for the purpose of reducing insertion loss and minimizing unwanted light reflections at the surfaces.

15. Claim 12, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Fan in view of Tehrani.

Fan in view of Tehrani discloses the invention as set forth above in Claim 1, except for the second collimator having a lens surface with a reflective layer. However, both Fan and Tehrani further teach that a reflective layer may be placed on the second optical fiber/collimator (See for example 19', 22' in Figure 4 of Fan; 22, 15 in Figure 3 of Tehrani). Additionally, Tehrani teaches that a collimating lens may be utilized as part of the optical fiber collimating assembly (See 15 in Figure 3; col. 3, lines 25-39 of Tehrani), and that the lens surface of the collimating lens may include the reflective layer (See for example 22 in Figure 3 of Tehrani). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the second collimator have a lens surface with a reflective layer, as additionally taught by Fan and Tehrani, for the purpose of simplifying alignment of the reflective layer with respect to the second collimator, while providing appropriate light energy concentration/focusing or collimation based on the intended application.

***Conclusion***

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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